

**Issue 8
October-December 2015**

Defining STEAM	1-2
Mathematics & Science Partnership Grants Awarded	3-4
ND STEM Conference Coming in April 2016	5
Assess Career Readiness...Now...In Any Classroom	6
Student Spotlight: Learning STEM	7
Educator Spotlight: Kayla Delzer	8-10
Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) Program	11
Mathematics Professional Development Modules and North Dakota Mathematics Leadership Team	12
NDDPI is Now on Twitter!	13
LEND	13
Picture Writing-Fostering Literacy Through Art	14
Save the Date: NMSI <i>Laying the Foundation</i> Summer Conference 2016	15
Reflections on NMSI Professional Development	16
Upcoming State and National Conferences	17
Call for Educators and Students	18
Grant Opportunities	18
In the News	19
Resources	19-20
Other NDDPI Newsletters	20
MSP Reminders	21



The definition of STEM has been debated in various sectors nationally as well as locally. Featured in the next several STEAM newsletters will be STEM/STEAM experts from North Dakota who will share their thoughts on what STEM education is. These authors do not necessarily represent the North Dakota Department of Public Instruction (NDDPI). Our first author was Jamie Wirth, Director of the Great Plains STEM Educational Center at Valley City State University. Our contributor this month is Rebecca Engelman, Arts in Education Director, North Dakota Council on the Arts (NDCA). Ms. Engelman has worked with numerous schools and organizations to incorporate thoughtful and well-integrated STEAM initiatives. Through the NDCA, Rebecca has awarded various grants aimed at the integration of STEAM. To learn more about the NDCA and the various grants, visit www.nd.gov/arts/grants.

Defining STEAM

*By: Rebecca Engelman, Arts in Education Director
North Dakota Council on the Arts*

When STEM was first introduced as “the next big thing”, the thoughts behind it basically centered on the need within the industry for more workers in STEM fields due to an aging workforce and an increasingly innovative world market. In response to these needs, and to remain competitive in a global marketplace, our leaders are doing everything in their power to push a focus on STEM education.

But in spite of the emphasis on all things STEM in our schools and lucrative job prospects, high school students aren't sticking with STEM. *“Even though the number of jobs in science and engineering is expected to surge in the years to come, close to 60% of the nation's students who begin high school interested in science, technology, engineering, and math, or STEM, change their minds by graduation”* (Morella, 2013).

As teachers and parents, we understand there will always be those students who are naturally drawn to and demonstrate a natural inclination and ability towards certain subject matters such as science, math, language, physical activities, and various forms of creative expression. If STEM literacy is the goal for all students, then we must create pathways so that ALL students, regardless of their inclinations and abilities, can achieve success. And even though science, technology, engineering, and math are great things on which to teach and focus, they cannot be the only pathway to STEM literacy. Adding the ‘A’ to STEM (meaning using art to engage STEM learning, or using art as a valuable perspective or element for STEM learners) to create STEAM allows ALL students, regardless of their interests or abilities, to enter STEM learning from a position of strength.

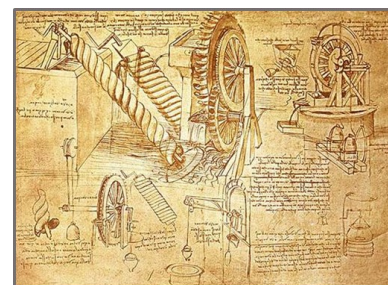
Why STEAM? To begin, one must be clear on what the **A** actually represents. The **A** is more than drawing pictures of a cell and/or singing a song to recall the periodic table. In STEAM, the **A** represents “*how society develops, impacts, is communicated and understood with its attitudes and customs in the past, present and future*” (Yakman, 2008, p.16). I invite you to envision the **A** as a large umbrella that encompasses the fine arts (music, dance, visual arts, performing arts, and media arts), language arts, and liberal and social arts. These are the areas of the curriculum that promote the development of various forms of literacy which include visual, cultural, media, and other 21st century literacies, along with the 21st century skills of creativity, communication, collaboration, and critical thinking. The arts connect us to the world, culture, society, and what it means to be human.

Defining STEAM (continued)

STEAM isn't so much about building a relationship between the arts and STEM, but about **reintegrating** the two in the classroom. Because there is overlap between the creative process and the scientific method, utilizing arts integration techniques in STEM can benefit the students in learning both artistic and STEM concepts and ultimately increase creativity. The arts also provide an arena where the seven intelligences—the visual/spatial, the kinesthetic, the musical/rhythmic, the interpersonal and intrapersonal, the natural, the mathematical/logical, and the verbal linguistic—are all recognized and addressed. Elliot Eisner, former professor of Art and Education at the Stanford Graduate School of Education and one of the leading academic minds in the United States, championed the arts as,

“Developing different forms of thinking, including an ability to see qualitative relationships within and among texts, an understanding that form and content are inextricably linked, an understanding that how something is expressed is only a part of what is meant, and the awareness that not everything knowable can be expressed through written language” (Sanders & Albers, 2010, p. 6).

The arts are the perfect vehicle for finding the “elegant fit” necessary for **authentic** and **meaningful** integration to occur. The strategies of arts integration are educationally powerful because they are grounded in deep connections between the arts and cognition and between learning, social, and emotional development (Rabkin & Redmond, 2004, p. 152). The **A** is the cord that binds the heart to mind, the thread that weaves curriculum together, the glue that binds knowledge and application. It is the grease that keeps the wheels moving. With all of the research currently available, it is clear that positioning the arts as a side-note and a “maybe” to STEM benefits no one. Adding the **A** to STEM gives educators and others permission to harness its power and use it as a tool for creating students who are not only STEM literate, but also **GLOBAL CITIZENS**.



If we have learned anything at all from the long history of education it is this: “Our education system was designed by powerful and pervasive currents reflecting the intellectual, economic, and social trends of a burgeoning industrial economy” and “further shaped by more immediate influences – from the “science” of intelligence and inequities of state school funding formulas, to federal accountability” (Rabkin & Redmond, 2004, p 148). As social and economic trends change, and as methods of research on the brain and learning improve we realize that “the next big thing” must adapt to best meet the needs of those we serve, our students. When we know better, we simply do better. Adding the **A** to STEM allows for a fluid progression of learning and understanding to occur and hopefully leads us to the day when acronyms are no longer necessary...to a day when teachers skillfully apply strategies that engage all minds and schools become joyful places of learning for **ALL** students.

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Resources

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- ⇒ www.salzburgglobal.org/fileadmin/user_upload/Documents/2010-2019/2015/Session_547/SalzburgGlobal_Report_547_FINAL_lo_res.pdf
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Mathematics & Science Partnership Grants Awarded

The NDDPI is happy to announce the recipients of the Mathematics & Science Partnership (MSP) Grant awards. Those receiving grants are:

- ◆ Mayville State University (MSU)
- ◆ North Dakota State College of Science (NDSCS)
- ◆ University of North Dakota (UND)
- ◆ Valley City State University (VCSU)

Congratulations!

The MSP program is designed to improve the content knowledge of teachers and the performance of students in the areas of mathematics and science by encouraging states, Institutes of Higher Education (IHEs), Local Education Agencies (LEAs), and elementary and secondary schools to participate in programs that:

- Improve and upgrade the status and stature of mathematics and science teaching by encouraging IHEs to improve mathematics and science teachers' education;
- Focus on the education of mathematics and science teachers as a career-long process;
- Bring mathematics and science teachers together with scientists, mathematicians, and engineers to improve their teaching skills; and
- Provide summer institutes and ongoing professional development for mathematics and science teachers to improve their knowledge and teaching skills.



Following are brief descriptions of the award recipients' MSP projects.

Engineering Concepts and Best Practices in STEM Education

By Mayville State University

Mayville State University's Educational Engineering Institute (EEI) is a comprehensive professional learning program where teachers learn about engineering concepts and best practices in STEM education. The program is designed to: (a) increase teachers' knowledge of different fields of engineering and STEM methodologies in the K-12 classroom, and (b) improve student academic achievement in mathematics and science. The key features of the EEI are that K-12 teachers work alongside engineering and STEM educators to learn instructional practices that support the 21st century learner. Content knowledge is delivered in fields of engineering and the engineering design process (EDP), and is supported in unit planning using the Backwards Design model (UbD), standards-based instruction, PBL, and technology integration. Engineers provide content and hands-on learning activities covering a variety of engineering fields. STEM educators deliver instruction regarding classroom implementation of the EDP, PBL, 21st century skills development, and provide the participants with information on how to locate and utilize numerous STEM instructional resources.

The EEI is a collaborative project between:

- ◆ MSU STEM Education
- ◆ UND College of Engineering and Mines
- ◆ NDSCS
- ◆ NDSU Department of Teacher Education and School of Engineering
- ◆ Dakota Science Center
- ◆ Red River Valley Education Cooperative

Mathematics & Science Partnership Grants (continued)

Skills Community of Practice

By North Dakota State College of Science

The NDSCS is launching a Skills Community of Practice focusing on career-ready skills as its MSP project. This proposed Skills Community of Practice (Skills CoP) brings educators together to determine where students need the most improvement and then determine how best to teach these skills within their classroom setting. The UND, VCSU, MSU, and NDSU are working with NDSCS on this project, as these career-ready skills are also relevant to their K-12 STEM work.

Implementation will spread across North Dakota by first providing 80 hours of in-depth professional development for 25 core teachers and then 24 hours of introductory professional development and mentoring to 40 exploratory teachers. The professional development will include the existing North Dakota Math Leadership Group's skill modules, North Dakota Career & Technical Education's (CTE) Career Ready Practices rubrics, and NDSCS's You're Hired STEM program. This innovative approach of a Skills CoP enables likeminded educators and invested higher education partners to make an achievable and sustainable change in our students' career-ready skills that are essential to their math and science achievement.

STEAM Energy!

By Timothy Young, Mark Guy, Steven Ralph, University of North Dakota

STEAM Energy! is a multidisciplinary partnership between UND, Sitting Bull College, Fort Berthold Community College, Inspire Innovation Lab, and North Dakota State Historical Society. We will be offering professional development to 70 middle and high school teachers from the following five districts and schools: Standing Rock/Ft. Yates Public School, Mandaree Public School, Four Winds Tribal School, Midway Public School, and Valley Middle School. Teachers choose an integrated energy theme that will be taught across math, science, English, art, technology, and social studies in the 2016 -2017 school year. Teachers can choose from a suite of energy topics ranging from renewable to non-renewable, many of which boil water to produce steam and thus electricity, revealing our double meaning of STEAM. Each energy activity will follow an appropriate pedagogy associated with that discipline and aligned with both the North Dakota State Standards, Common Core, and the Next Generation Science Standards. The STEAM Energy! curriculum will move each energy activity in the direction of solving a real world problem. The whole year will be spent investigating the inextricable need to change local urban energy demands from non-renewable sources to renewable sources. Through learning of history, writing, data collection, calculations, engineering, urban planning, and design, students will produce a plan to transform their local urban city into a sustainable city for the future. This multifaceted project will be researched with a number of evaluation instruments to determine the outcome on student learning.

Implementing Integrative STEM Education in the Classroom

By Jamie Wirth, Valley City State University

The Great Plains STEM Education Center (GPSEC) at VCSU has begun work on its project, "Implementing Integrative STEM Education in the Classroom." Thirty-six K-12 teachers from eight schools (Edgeley, Ellendale, Enderlin, Kensal, LaMoure, Lidgerwood, Litchville-Marion, and McClusky) will participate in ten days of professional development from October 2015 – June 2016. Professional development workshops will focus on the engineering design process and how teachers can integrate content from the four individual STEM disciplines into hands-on, project-based learning. Content will include pedagogical strategies in STEM along with training in a wide range of existing STEM curriculum opportunities. Teachers will also have the opportunity to interact with science and engineering professionals to help enrich their classroom instruction.

Also, the GPSEC will host a Family Engineering Night at each school in the fall/winter of 2015, and a STEM Design Challenge Night at each school in the spring of 2016. Finally, the GPSEC staff will conduct classroom visits at the participating schools to help teachers implement and assess their integrative STEM lessons. Collaborating with GPSEC in these efforts are the following: NDSU College of Engineering and School of Education, NDSCS, North Dakota State Historical Society, and Tecton Products, LLC.

ND STEM Conference Coming in April 2016

Great ideas will be sprouting and blossoming this spring at the state STEM conference in Grand Forks. This year's theme, "Growing Together," expresses not only the value of professional learning but also the importance of growing through collaboration across disciplines. For the second year in a row, K-12 teachers in science, technology, engineering, and math will gather to participate in workshops and presentations on best practices in STEM education.

State Superintendent Kirsten Baesler will kick off the conference, introducing keynote speaker Don Wettrick, author of the popular book *Pure Genius: Building a Culture of Innovation and Taking 20% Time to the Next Level*. Wettrick, who is Innovation Coordinator at Noblesville High School just outside Indianapolis, hosts an internet radio program, InnovatED. He has worked as a middle school and high school teacher, educational and innovation consultant, and educational speaker. Don is passionate about helping students find their educational opportunities and providing them with the digital tools they need to give them a competitive edge.

Due to popular demand, Amelia Terrapin, founder of Mobius, a science curriculum taught through creative movement, will be returning to the conference. In her session, "Using Movement to teach STEM in the Classroom," Terrapin will once again demonstrate the power of learning through dance.

The conference is sponsored by the ND Science Teachers Association, the ND Council of Teachers of Mathematics, ND STEM, UND STEM, the NDCA, and the NDDPI. It is funded in part by a grant from the National Science Foundation.

Upwards of 600 teachers are expected to attend the conference to learn about the latest strategies and concepts within their respective fields as well as those that cross traditional discipline boundaries. Educators should plan to come early for special STEM events scheduled for Thursday evening on the UND campus.

To submit a proposal for a conference session, potential presenters can use this [link](https://docs.google.com/a/mygfschools.org/forms/d/1-3Rs2-yhXAvLd3VQXR003Gwwa07vzrSlm9T55QLI_4A/viewform?c=0&w=1) or https://docs.google.com/a/mygfschools.org/forms/d/1-3Rs2-yhXAvLd3VQXR003Gwwa07vzrSlm9T55QLI_4A/viewform?c=0&w=1

Later this winter, more information & registration will be linked at:

www.NDSTA.k12.nd.us
www.ndctm.k12.nd.us
www.ndstem.org/

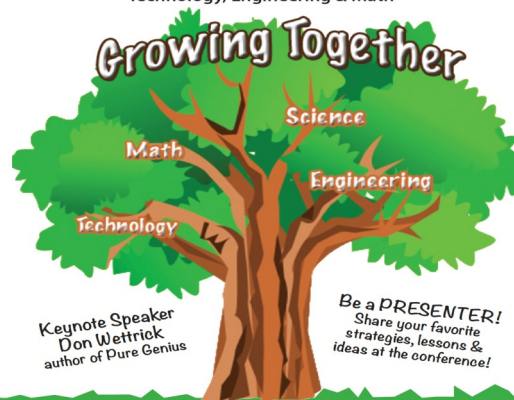
See you in Grand Forks!

Fresh ideas are taking root!

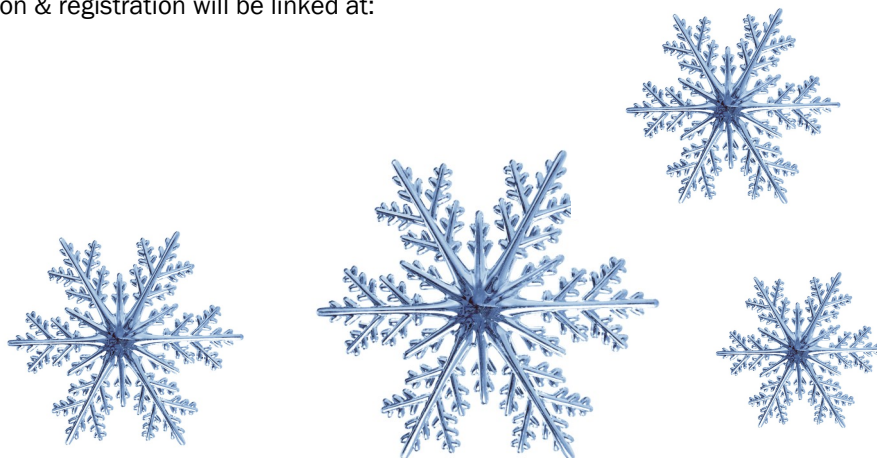
April 22-23, 2016 in Grand Forks

STEM Conference

Your best professional development in Science,
Technology, Engineering & Math



The North Dakota Council of Teachers of Mathematics,
the North Dakota Science Teachers Association,
the North Dakota Department of Public Instruction,
ND STEM, and UND STEM are joining forces to present
a joint instructional conference for YOU and all teachers
in the state and beyond!



Assess Career Readiness...Now...In Any Classroom

By Michael C. Netzloff, CTE Specialist

During instruction and assessment of activities, performances, or projects already taking place in the classroom, work experiences, or other career-focused endeavors, there has been a general lack of consensus on how to assess career ready practices (otherwise known as soft skills), what these skills encompass, how they are defined, or to what degree they could be measured. It is with this purpose in mind that the ND Department of Career and Technical Education (NDCTE) developed a document to answer and define these points and provide a usable device which measures what is already taking place within the classroom and workplace in an area of skills often overlooked.

The definition and outline of the Career Ready Practices (CRP) were established under the Common Career and Technical Core (CCTC), as released in 2012, from the NASDCTEc (National Association of State Directors of Career and Technical Education Consortium). These Practices, as well as the CCTC itself, were developed with help from national educators, administrators, and business experts and were derived from the earlier Career Clusters/Pathways Framework model. It has been approved by 42 states as a foundational piece to career readiness nationally and is, thus, foundational to the task at hand.

Starting from the paragraph-form given in the CCTC, the rubrics, with their individual competencies, were written and developed using sample rubrics of workforce readiness found in differing forms in other states (including Washington and Nevada). They were then edited and commented on by state supervisors, administrators, teachers, business leaders, and parents. The result is a document that can measure 12 facets of career readiness, further divided by elements within each, under a scale from one to four and similar to the standards-based model.

It was never the intention of these rubrics to create more work for the instructor/advisor or to add more activities or lessons to his/her current load; however, it is the intention of taking what is already being done and taught and making career ready skills within those projects clearly apparent and assessable. This in turn can provide a scale, or score, by which the student can be assessed not only on his/her technical knowledge but also on how to apply that knowledge within job activities while demonstrating other self-strengths and responsibilities to be a successful and contributing member of the working world. A school could potentially then graduate students under their traditional scoring and give them a certificate showing how the same student, while attending school, measured in career ready skills.



Thus far, NDCTE has begun to distribute the rubrics to schools to use as a tool. The main document itself; the short, two-page version (used to quickly annotate scores); a Recommendation of Usage Guide; and a document describing the original 12 CRP can all be found on and printed from the NDCTE website (under Program Support Services). In an effort to make the scoring of these rubrics even easier, NDCTE has been working alongside North Dakota EduTech in the implementation and integration into PowerSchool/PowerGrade programs. Based on this, four schools around the state were asked to join in testing the system in the classroom and on PowerGrade under the basic recommendations as discussed in the usage guide. These schools encompass classrooms from K-12 and outside of the CTE realm as well. It is now the intent to monitor the progress of these pilot programs and also to educate the business community of North Dakota on what is being done within the school system, for them to be better able to identify potential workers and their career readiness.

For more information regarding assessing career readiness, contact: [Michael C. Netzloff](#) or visit the [CTE career readiness website](#).



Student Spotlight: Learning STEM

By Mayim Stith

Mayim Stith is a West Fargo high school student who will be a graduate of the first cohort of students who attended the STEM middle school several years back. In this article, Mayim reflects on her experience and how it has impacted her lifelong perspective.

The Engineering Design Process is an eight-step process for problem solving that I first became familiar with in sixth grade. Since then I have used it to write a scholarship-winning essay, teach geography to friends, tile a floor, find a prom date, and work at a preschool. It may be the most useful and important thing I have learned as a student.



My sixth grade class was the largest ever in our school district. With years ahead before new buildings could be constructed, the solution was to send extra students to a spare community building for their middle school education. In an attempt to turn this overflow bin into an attractive option, the school board decided to make it an educational experiment. The new campus would be driven by the principles of something called STEM Education, an all-but-unknown term in 2009.

I went to the STEM Center because I was terrified of middle school. I also went to the STEM Center because it was in my backyard. I did not go to the STEM Center because I was particularly interested in science, technology, engineering, or math. My interests were books, music, and writing. However, because my interests also included avoiding the big middle school with its intimidating maze of hallways and crowds of people, when asked if I wanted to give this a try I said, "Sure, why not?"

The first hint that my new school was going to be somewhat non-traditional was the fact that our chairs had not arrived. On the first day we had smartboards, 120 students, 7 teachers, and a pile of carpet squares. My math teacher was unperturbed. With our carpet squares in a circle, we spent the day designing our seating chart on graph paper. It was like no math lesson I had ever experienced.

I don't think everyone would say that their middle school years were among the best in their lives. I would. I learned slope by designing a golf course. We sat on stability balls and curated project fairs. Many people don't realize that it takes more than an acronym to make education STEM; it takes teamwork, problem-solving, and project-based learning. I worked in small groups to complete projects that united threads from all my classes and individual interests. Often our teams would gather in a classroom and stay there all day, utilizing all our subjects in our work and rendering the musical chairs game of bells and class periods obsolete. All around there was the Engineering Design Process: define the problem, research the problem, brainstorm solutions, choose the best solution, build a model, test your solution, communicate your results, and redesign as needed.

So what's the problem? The problem is that only a few students in my district experienced the kind of immersive, fascinating education that allowed my love of learning to flourish. Only a few nationwide experience project-based learning at all, or get to develop the teamwork and twenty-first century skills that are essential in the world today.

If I hadn't chosen the small middle school in my backyard, I might think that there was nothing to be done. But I don't believe that. I believe in problems and solutions. I believe in redesigning where redesigning is necessary. And I would be hard-pressed to find a place where redesign is needed more desperately than our classrooms.

So I've been brainstorming, and I have a solution to test. The solution is me. I believe that as a teacher, I can help students nurture their intrinsic love of learning. I believe that project-based, interdisciplinary education is a key to designing lives that are fulfilling and valuable. The torch was passed to me at the STEM Center, and I want to pass it on.

And if I hit a wall? The Engineering Design Process will be there for me. I will define the problem and get working. I will redesign and try again. Click [here](#) for more information on West Fargo Public Schools STEM.

Educator Spotlight: Why the 21st Century Classroom May Remind You of Starbucks

By Kayla Delzer



Kayla Delzer is a second grade teacher and Project Lead the Way lead teacher in West Fargo, North Dakota. In August, she began her eighth year of teaching second grade. She holds her master's degree in Elementary Education and just started the process to become National Board Certified, the highest mark of professional accomplishment.

Kayla is a technology enthusiast, and she works as a consultant for several school districts. She frequently travels around the United States to speak at EduTech conferences. Kayla is a highly connected educator, and her classroom Twitter account, @tweetingtopdogs, has allowed her students to learn virtually with classrooms and experts from all over the world. On July 23, 2015, she gave her first Tedx Talk, *Reimagining Classrooms: Teachers as Learners and Students as Leaders*.

She is an exclusive blogger for Creative Teaching Press, SDE Expert, Remind Connected Educator, TenMarks Advisor, GoNoodle Ambassador, and has been a featured "Educelebrity" during numerous education Twitter chats. She is highly sought after by educational and technology companies to preview, demo, and review their products.

It's been my dream to make my second grade classroom look more like a "Starbucks for kids", and less like, well, a classroom.

Think about when you go to Starbucks to complete some work. Why do you choose to work there? Where do you choose to sit? I usually gravitate towards the comfy seating choices like the couches and big chairs, and yet, I see people choose the tables and chairs over and over again. Regardless, when you walk into Starbucks, you have choice. You get to choose where you sit. No one checks you in and directs you to a spot, telling you that you must sit there for the remainder of the day to do your work. If you need to get up, walk around, or choose a different seat, you are free to do so.

As I sat in our local Starbucks this past summer, I looked around and thought—why can't my classroom look like this?

After several weeks of planning and a little bit of faith, what resulted was this:

But how did I get to this point? Let me take you through some common questions I get asked about classroom redesign—so that hopefully, you can do the same.

What did your process look like?

Before I even purchased a single thing, I thought about why I was doing a classroom redesign. If we truly want to prepare our students for the real world, we need to put them in responsive, dynamic environments that reflect life outside of a traditional classroom. And what's that life outside like? Full of choices, where adults are responsible for their own learning. As a college student visiting my classroom once said, "It's like you're treating them like little adults." And as my teaching has changed, my classroom design needed to change right along with it.



What came out of that was flexible seating and open floor space: I thought about my students who would prefer to stretch out on the floor, and I purchased yoga mats and bath rugs for them to lay out on and work. Simultaneously, my fellow educators contributed extra clipboards they weren't using so students would be able to write just as easily.

Why the 21st Century Classroom May Remind You of Starbucks

(continued)

After consulting Erin Klein, a classroom design guru who has been “ditching her desks” to avoid “the cemetery effect” for a few years now and sharing her experiments on her [blog](#), I thought about my classroom and the traditional chairs and tables I was given—and I came up with a plan.

Looking around my classroom, I quickly realized that I had far too much furniture, so I got rid of four tables, my huge teacher desk, 20 traditional chairs and a file cabinet. Next, I started looking for resources to redesign and repurpose what I already had. I looked around my house and in my storage closet to pull some pieces that I wasn’t using, and scavenged Hobby Lobby for some new purchases.

Now, I have a large, open area for whole group instruction and five remaining tables, each designed with a specific purpose:

- a small group instruction whiteboard table with stools
- a stand-and-work table with no chairs
- a crate seats table
- a sit-on-the-floor area with core disks or pillows and work table (see right), or at a stability ball chairs table (below)



Do you have a seating plan or arrangement?

No, I don’t have a seating plan for kids. I allow students to responsibly choose where they work every day. When they arrive in the morning, they make a choice for the day but are free to switch places as they see fit throughout the day. I have enough seating options in our classroom that there are never issues about running out of one type of seating.

How do you ensure students are selecting smart choices to work?

At the beginning of the year, students spent an entire day trying out each of the seating choices. After that, I began to let them self select their seating daily.

I think this is an important step in the process. For

example, one student who stands and works originally swore up and down that he would work best on the stability balls—but that changed. It only took him falling off the chair once and almost bouncing out the door for us to both realize that it probably wasn’t a smart fit for him.

One big note: Students know I always reserve the right to move them, and they know I always have their best learning in mind.

What about your students with behavior issues?

The behaviors of my students who have exhibited aggressive or distracting behaviors in the past have significantly decreased. There is power for them in the choice to select where they will work. They know the work isn’t optional, but choosing where they work is.

Why the 21st Century Classroom May Remind You of Starbucks

(continued)

Where do students keep materials?

We have work bins in the corner of our room where students keep folders, math journals, and other personal items. We use community supplies at each of the five tables, and I have individual baskets of supplies for students that choose to work on yoga mats or work rugs. If you don't have work bins for students, get three drawer stackers and place them throughout the room, or put materials in baskets. You may have to get creative and repurpose something you already have—or something that another teacher has, but isn't using.

What do parents think of all this?

This was an amazing question I saw on my Instagram page, and it pushed me to reach out to a parent for an opinion for this article. Here was her response:

"From a parenting perspective, I have really enjoyed the flexible seating option Mrs. Delzer has offered this year. When I was able to observe the seating options in her classroom, it just really made a lot of sense to me...meeting the kids' needs and also allowing them the responsibility and flexibility to choose where they will learn best for the day. My daughter has come home just thrilled at the opportunity to choose where she sits and it appears to help her focus when she isn't expected to sit in a chair for long stretches of the day."—Lorraine Albrecht

If we take a look at classrooms over the past 70 years, we are seeing the same type of learning environments, year after year. The world is changing, yet our classrooms are remaining much the same. Revitalizing space is a straightforward way to let students exercise choice in the learning environment and find academic success on their own terms.

Now several weeks into our school year, I can't imagine going back to traditional seating. Distracting behaviors have been almost completely eliminated while engagement and student participation are at an all time high. And as I look around our classroom, I feel proud of what we have accomplished—a Starbucks for kids.

Click on [Kayla Delzer/Top Dog Teaching](#) for more information.



Social Media Information

[Blog](#)

[Email](#)

Instagram @topdogteaching

Twitter @tweetingtopdogs @mrsdelz



INFORMATIONAL

To: School Administration, Science Teachers, Mathematics Teachers
and Computer Science Teachers

From: Paul Keidel
ND PAEMST Coordinator

Subject: Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST)
Program **"This is an Elementary Grades K-6 nomination year"**

The Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) Program was established in 1983 by the White House and is sponsored by the National Science Foundation (NSF). This year the program will identify outstanding science (including computer science) and mathematics teachers teaching grades K-6. Teachers are identified in each state and the four United States jurisdictions. These teachers will serve as models for their colleagues and will be leaders in the improvement of science and mathematics teaching.

In 2016, up to 10 state finalists will be selected, five in each group of Math and Science. From these 2016 state finalists, a national committee will choose two national level awardees, one in each award group from North Dakota. Each National awardee will receive a \$10,000 personal award and an all-expense paid trip to recognition events and other activities in Washington, D.C.

Please nominate an outstanding teacher from your school district. A nomination form found at www.paemst.org will start the process and can be completed by anyone. Teachers can start submitting applications now and the deadline is May 1, 2016. All nominations are due April 1, 2016.

I am The PAEMST State Coordinator for math and science (including computer science). Please contact me at paul_keidel@bismarckschools.org or (701) 425-2020. My mailing address is:

Missouri River Education Cooperative
3001 Memorial Highway, Suite B
Mandan, ND 58554

Mathematics Professional Development Modules and North Dakota Mathematics Leadership Team

The [Mathematics Professional Development Modules](#) were developed collaboratively by teachers, higher education faculty members, and state education agency (SEA) staff from Iowa, Montana, North Dakota, and South Dakota. The states were part of a Council of Chief State School Officers (CCSSO) project to strengthen and support the professional community of secondary teachers of mathematics across the four-state region. The modules provide outlines for professional learning content and are intended to be delivered in-person in a three-hour professional development session. They may also be adapted for other delivery channels, such as synchronous and asynchronous online professional development. The nine modules developed include:

1. *Effective Questioning*
2. *Mindsets*
3. *Using Real-World Contexts to Increase Engagement*
4. *How to facilitate Productive Discourse*
5. *Planning for Discourse Using the 5 Practices*
6. *What is Discourse?*
7. *Strategies for Modifying Existing Math Tasks to Increase the Cognitive Demand*
8. *Using Assessment in Learning: Looking at Student Work*
9. *Collaborative Grouping in Secondary Classrooms*

North Dakota continues to move forward on the refinement and implementation of these modules. The initial Mathematics Leadership Team (MLT) has been charged with this task. Listed below are the leaders who participated in the original ground work of the development of these modules.

- William Martin, NDSU
- Cathy Williams, Grand Forks Public Schools
- Nathan Welstand, Bismarck Public Schools
- Michele Liams, UND
- LaCosta Potter, SEEC
- Tammy Meyer, Devils Lake Public Schools
- Rhonda Grindy, Minot Public Schools
- Kristeen Monson, Valley-Edinburgh Public School District

The next step for this team is to review and refine the modules based on the findings of the Red Light, Green Light needs assessment. This group will also work on the best way to disseminate the modules to the field. This may be via face-to-face professional development or web-based professional development.

If you have any questions on the math modules please contact:

- ⇒ [Beth Larson-Steckler](#) or (701) 328-3544
- ⇒ [Russ Ziegler](#) or (701) 328-2629



NDDPI Now on Twitter!

The NDDPI is now on Twitter @NDDPI

The Division of Student Innovation within the NDDPI is also on Twitter! Follow us @NDDSSI

Other Great Twitter Sites for STEM

@NSTA: The National Science Teachers Association. Information on science teaching, and activities for the classroom.

@TeachingSTEM: Teaching #STEM is a networking and information service for science, technology, engineering and mathematics teachers and educators in schools and colleges.

@CADREK12: CADRE supports STEM education researchers and developers funded by NSF.

@SciAfterSchool: Dedicated to improving afterschool STEM learning for all youth.



Links for Educators in North Dakota (LEND)

The [Links for Educators in North Dakota \(LEND\)](#) website targets primarily new and veteran educators. It is also available for access by the general public. The purpose of the LEND is for the sharing of vetted resources for North Dakota educators.

The LEND project began in the summer of 2014 and is a project the NDDPI continues to work on. Key elements of the project are highlighted below.

- ⇒ The primary focus of LEND is for educators to submit vetted standards-based lesson plans to publically share with other educators.
- ⇒ A secondary focus of LEND is to serve as a resource for preservice teachers as they begin their careers by assisting them in building educational portfolios with quality lessons that can promote best practices.
- ⇒ The LEND website will provide links to other states who are offering similar resources for their educators to gather quality information from which to collaborate and share.
- ⇒ An established screening process assures the alignment of resources with North Dakota standards to ensure students are getting the rigor and readiness skills they need in order to be college and career ready and to work towards closing achievement gaps.

There are several steps LEND will be taking in the new year. During the first months of 2016, the NDDPI Office of Academic Support will work towards the establishment of a vetting process designed to be implemented throughout the submission process, as well as the review and posting of the lesson plans. This vetting process will also include elements which outline how best to include non-North Dakota submitted materials (i.e. vendors, other state's vetted lessons, etc.). After this process has been solidified, there will be a search for an "All Call" for lessons across the state. Lessons submitted will be vetted and, if accepted, posted to the website. Media outlet announcements will be made to spread the word and expand this resource.

Inquiries regarding LEND can be directed to:

[Anjanette M. Parisien](#)

Assistant Director/Content Specialist
Office of Academic Support
(701) 328-4612



Picturing Writing: Fostering Literacy Through Art ND Heritage Center, June 13-17, 2016

The North Dakota Department of Public Instruction (NDDPI), North Dakota Council on the Arts, and North Dakota Council of Humanities is collaboratively hosting the Picturing Writing: Fostering Literacy Through Art training facilitated by Beth Olshansky, Director of the Center for the Advancement of Art-Based Literacy at the University of New Hampshire in Durham and author of *The Power of Pictures: Creating Pathways to Literacy Through Art* for teachers.

Picturing Writing is a dynamic art-and-literature-based approach to writing using simple hands-on art experiences, the introduction of quality picture books, and an ongoing artists/writers training to promote literacy while meeting the needs of students with diverse learning styles. With a two-decade-long history of proven effectiveness, Picturing Writing can be easily woven throughout the language arts, science, and social studies curriculum. An array of concrete visual tools such as storyboards, specially designed brainstorming sheets, and accordion folders will ensure that students create art and writing with clear literary purpose. The Picturing Writing process has been used as an effective tool for making cultural connections and for Native language instruction.

Expected Outcomes:

- To expand teacher's notions about literacy learning to recognize the important role which visual and kinesthetic thinking can play in supporting the development of basic literacy skills.
- To provide teachers with a new framework for facilitating the writing process.
- To provide teachers with a rich experiential learning opportunity which will encourage teachers to rethink traditional classroom practices regarding the teaching of basic skills.
- To offer concrete tools for fostering literacy for children with diverse learning styles.
- To provide a model for integrating Picturing Writing into the curriculum and into Native language instruction.



Upon successful completion of all course requirements, participants will receive the following:

- *The Power of Pictures: Creating Pathways to Literacy Through Art* (book and instructional DVD)
- Three instructional manuals and one poetry unit packet
- Five classroom posters
- Seven exemplar lesson plans
- Classroom pack of high-quality art materials

This five-day training is scheduled for June 13-17, 2016, at the North Dakota Heritage Center in Bismarck, North Dakota from 8:30 am—3:30 pm. Registration will begin at 8:00 each day. Lunch will be provided. There is also housing available through Bismarck State College for \$30 for a single room per night and \$25 for a double room per night. Two graduate credits are available for \$100, but must register and pay through University of North Dakota, North Dakota State University, and Minot State University. More information will be forthcoming, please visit the NDDPI Events page.

Priority will be given to educators who meet one or more of the following criteria:

- Educators working in the Bureau of Indian Education schools and/or high percentage of Native American students
- Native language and culture teachers are highly encouraged to attend
- Educators working in a school with a student population consisting of 40% or more at or above poverty level
- Educators working in Title I schoolwide programs

If you have questions regarding registration, please email [Jill Frohlich](mailto:Jill.Frohlich@nddpi.org), NDDPI, or call (701) 328-2254.

If you have questions regarding the training, please email [Rebecca Engelman](mailto:Rebecca.Engelman@ndca.org), NDCA, or call (701) 328-7593.

SAVE THE DATE!

July 12-15, 2016

Science

Mathematics

English



NATIONAL
MATH + SCIENCE
INITIATIVE

LAYING THE FOUNDATION

Magic City Campus High School—Minot, ND

Two credits offered



NORTH DAKOTA DEPARTMENT OF
PUBLIC INSTRUCTION

Sponsored by

Division of Student Support & Innovation

Registration information coming soon!

Reflections on NMSI Professional Development

By JoAnn Schapp

Last summer, I attended the National Math and Science Initiative (NMSI) Laying the Foundation First Year training. It was four intense days of hands-on training. In the middle school session, I can tell you that no one was watching the clock waiting for class to end; we were completely engaged in the activities. At the end of the training, we each went home with four manuals and online support. I have revised my lessons to incorporate more NMSI lessons. I found these lessons to have more rigor, more integration with other subjects, and demand more critical thinking skills.

My eighth grade students did **Whirly Gig**. This lesson is an introduction to the scientific and engineering design process. Students had to design an optimum solution for landing a whirligig safely with maximum time of descent. The eighth graders also did Measuring Up which is an introduction to the concepts of random and systematic error in scientific investigations, how ideas of accuracy and precision impact decisions about measurement, and an introduction to the factor-label method. The last lesson that we have done with eighth grade is Moon Watch. In this lesson, students discovered the phases of the Moon are a regular pattern. They had to determine what causes the phases. There was also a piece, "Tides of War," which included an article about the importance of the phases of the moon and beach tides in the invasion of Normandy. There was also an assessment piece to determine depth of understanding.

Comments from students:

- ◆ *In Moon Watch, you can visually see how the phases change.*
- ◆ *It was so easy to understand the changes.*
- ◆ *It's fun, you still learn about Aerodynamics and Gravity, but we felt challenged to win.*
- ◆ *My seventh grade students started with **Beetle Races**. This lesson provided my students with the opportunity to tell the story of a beetle's journey. They created multiple representations of the beetle's journey by sketching its path, writing a short story, collecting data, examining average speeds, and discussing the meanings of their graph. There was also an assessment piece to help determine the depth of their understanding. They also did Up Close and Personal which is a lesson in the basic use of the microscope, but they also had to identify organisms found in freshwater using a dichotomous key.*
- ◆ *I'm learning so much more about graphing.*
- ◆ *My sixth grade students explored Happiness is a Straight Line...Diving Into Relationships. This lesson provided the students with an opportunity to develop a quantitative understanding of the relationship between dependent and independent variables. In part one, students investigated distance versus time, constant speed, and other aspects of motion using a stopwatch and their own motion. In part two, students investigated the motion of a marble rolling down a track.*
- ◆ *Its fun, but we also have to think.*



This summer, NMSI Laying the Foundation will be offered again. I strongly encourage everyone to try to attend. Those who went through the first year training, are very eager and excitedly waiting for this summer, so we can take year two.

Upcoming State and National Conferences

January 2016	<u>Future of Education Technology Conference (FetC)</u> January 12-15, 2016, Orange County Convention Center January 12-15, 2016—Orlando, Florida Conference & Expo: January 13-15, 2016
February 2016	<u>Winter 2016 Arts Integration and STEAM</u> February 6, 2016—Live or On-Demand
March 2016	<u>MSP Meeting</u> March 1-2, 2016—Renaissance Baltimore Harborplace Hotel in Baltimore, Maryland
April 2016	<u>3rd Annual STEM Conference: Best STEM Practices for the Next Generation</u> April 8, 2016—Cleveland, Ohio <u>2016 NDCTM & NDSTA STEAM Conference</u> April 21-23, 2016—Grand Forks, North Dakota If you are interested in presenting please <u>register</u> .
June 2016	<u>Math Summer Institute</u> June 13-14, 2016—Mandan, North Dakota <u>Picturing Writing: Fostering Literacy through Art</u> June 13-17, 2016—ND Heritage Center, Bismarck, North Dakota
July 2016	<u>NSMI Laying the Foundation</u> July 12-15, 2016—Minot, North Dakota <u>NTSA National Science Teachers Association 5th Annual STEM Forum & Expo</u> July 27-29, 2016—Denver, Colorado



Call for Educators and Students

Educators

We want to hear from educators in the field. If you are doing something innovative and exciting in the area of STEM/STEAM, please contact us. While North Dakota is a state in which there is usually one degree of separation, I know for a fact that there are innovative, exciting things happening in classrooms, libraries, and before and after school in the areas of STEM/STEAM that other educators are unaware of. This newsletter is a format for educators to share what they are doing. Please consider contacting us about what you are doing. We would love to share it in our newsletter. The next STEAM Newsletter will be going out in March 2016.

Students

Do you have a student who has excelled in the areas of STEAM? If so, please consider sharing this student and their accomplishments. The STEAM Newsletter will be featuring *Student in the Spotlight* as a regular feature.

Please contact:

[Beth Larson-Steckler](#)

Office: (701) 328-3544

Fax: (701) 328-0203

Grant Opportunities

Toshiba

Grades 6-12. Next grant cycle: February 1, 2016

Honda

Grant cycle deadlines:

February 1, May 1, August 1, and November 1

VOYA Unsung Heroes

Grant deadline April 30, 2016

Unsung Heroes Scholarship America

Laura Bush 21st Century Librarian Program

Grant period for this year is closed; keep on file.

The Captain Planet Foundation

Grant deadlines—September 30 and January 31.

Sol Hirsch Education Fund Grants

Application for the 2016-2017 school year opens February 2016.

The Verizon Foundation

This grant is by invitation only. Contact your Verizon Relations Manager in your area to learn more about this opportunity. (Site has a search engine to find your local Verizon Relations Manager).

Digital Wish Grants

Login to Digital Wish and submit a technology-based lesson plan for a chance to win over 50 different technology grants. Grants will be awarded on the 15th of every calendar month.

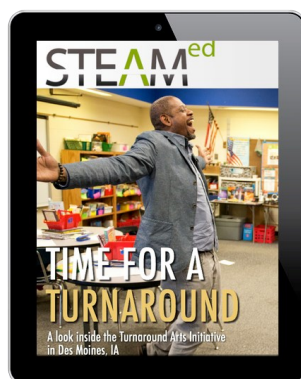


In the News

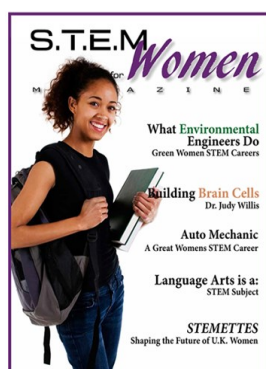
[STEM Funding Streams Expanded in NCLB Rewrite](#)

[Arts Based Learning of STEM Works Says NSF Funded Research Firm](#)

Resources



[STEAMed Quarterly Digital Magazine](#): Excited about STEAM and want to learn more about this innovative approach to education? Welcome to the STEAMed magazine! This quarterly publication is absolutely FREE to you, thanks to the generous partners in each edition.



[STEM Woman Magazine](#): It's not a curriculum, but rather a resource of awareness that exists to provide clarity on the subject of how we already incorporate STEM into every class, how to encourage the creative process and cultivate curiosity in both the teachers and students.



Scratch-Learning Code

With [Scratch](#), you can program your own interactive stories, games, and animations—and share your creations with others in the online community.

Scratch helps young people learn to think creatively, reason systematically, and work collaboratively—essential skills for life in the 21st century.

Scratch is a project of the Lifelong Kindergarten Group at the MIT Media Lab. It is provided free of charge.

What people are saying about Scratch Learning Code:

- ◆ *My two children were immediately hooked. Scratch allows kids to program by 'stacking commands' like LEGO blocks. Instead of reactively playing video games...now they can create them.*
- ◆ *I got Scratch, started playing with it, and have not been able to stop since. Scratch is one of the most fun things I have ever tried!*
- ◆ *I'm new to Scratch, but two of my students and I are already loving it! I've never seen students take to something so quickly or with such enthusiasm. It unlocks their creativity and empowers them.*

Resources

(continued)

The STEM to STEAM movement has been taking root over the past several years and is surging forward as a positive mode of action to truly meet the needs of a 21st century economy. STEM alone misses several key components that many employers, educators, and parents have voiced as critical for our children to thrive in the present and rapidly approaching future.

STEAM is an educational approach to learning that uses science, technology, engineering, the arts, and mathematics as access points for guiding student inquiry, dialogue, and critical thinking. The end results are students who take thoughtful risks, engage in experiential learning, persist in problem-solving, embrace collaboration, and work through the creative process. These are the innovators, educators, leaders, and learners of the 21st century!

STEM vs. STEAM

Much has been proclaimed about the need for more STEM “programs” in our schools. The logic is simple: the wave of future economic prosperity lies in a workforce that is well-versed in rising job markets like science, technology, engineering and math. Thus, there has been an increased investment in STEM initiatives in schools. This includes (but is not limited to):

- providing mobile devices for students (sometimes in the forms of computer labs, and other times in the form of 1:1 – a single device for each student)
- afterschool STEM clubs or programs
- STEM curriculum, where projects using STEM practices are embedded
- bring your own device initiatives
- STEM days to encourage hands-on exploration within each of these disciplines
- robotics programs

educationcloset's

steamportal

While these initiatives are a wonderful start into the exploration of these four areas of study, the critical process of creativity and innovation is missing. Students in STEM programs may have more experiential learning opportunities, but they are limited to only science, technology, engineering and math. Our economy requires so much more than an understanding of these areas – it requires application, creation, and ingenuity. STEM alone does not foster these essential nutrients.

STEAM is a way to take the benefits of STEM and complete the package by integrating these principles in and through the arts. STEAM takes STEM to the next level: it allows students to connect their learning in these critical areas together with arts practices, elements, design principles, and standards to provide the whole pallet of learning at their disposal. STEAM removes limitations and replaces them with wonder, critique, inquiry, and innovation.

Other NDDPI Newsletters

North Dakota AFTERSCHOOL Update 21st Century Community Learning Centers	Research/Resources Report Research and resources on educational issues relevant to North Dakota schools
ND ExcELLing Educator Title III—English Language Learner programs	North Dakota Homeless Education Program Updates on McKinney-Vento and other homeless information
ConnectED NDDPI Quarterly Newsletter	Directions Newsletter Roundup Newsletter Administrative Updates Child Nutrition & Food Distribution
Flickertail Newsletter Discovery Newsletter North Dakota State Library	STEAM Newsletter Title II B—Math Science Partnership

MSP Reminders

- Quarterly Report**

The lead agency is responsible for preparing and submitting the quarterly report. To access the template, click [quarterly report template](#). The quarterly report is due to the NDDPI on the following dates:

- ⇒ December 28, 2015
- ⇒ March 28, 2016
- ⇒ June 27, 2016
- ⇒ September 26, 2016

- Annual Progress Reports**

The lead agency is responsible for completing and submitting the annual progress report each year. To access the template, click [annual progress report template](#). The annual progress report is due to the NDDPI by October 30, 2016.

Contact Information

Laurie Matzke Division Manager Student Support & Innovation (701) 328-2284	Beth Larson-Steckler Program Administrator Title II, Part B (701) 328-3544	Patty Carmichael Fiscal Officer Title II, Part B (701) 328-3264
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